

Trend Study 18A-27-07

Study site name: South of Broons Canyon.

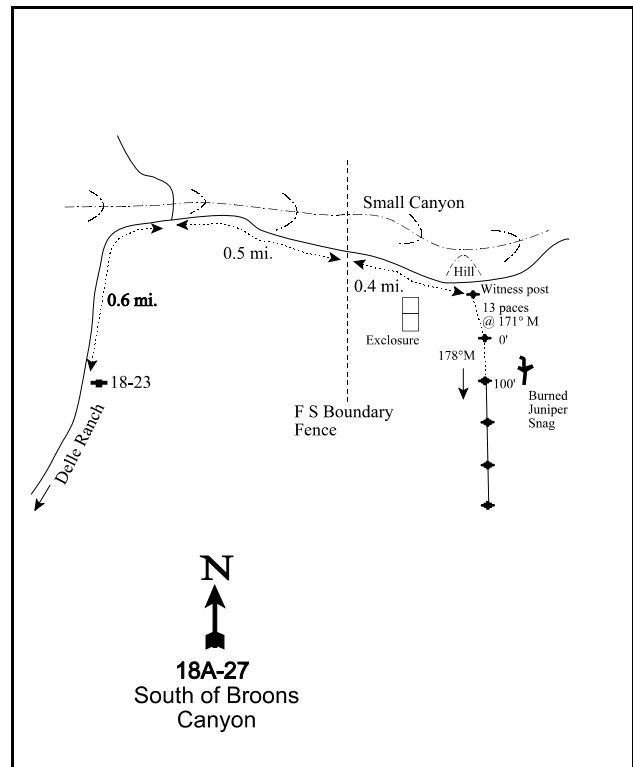
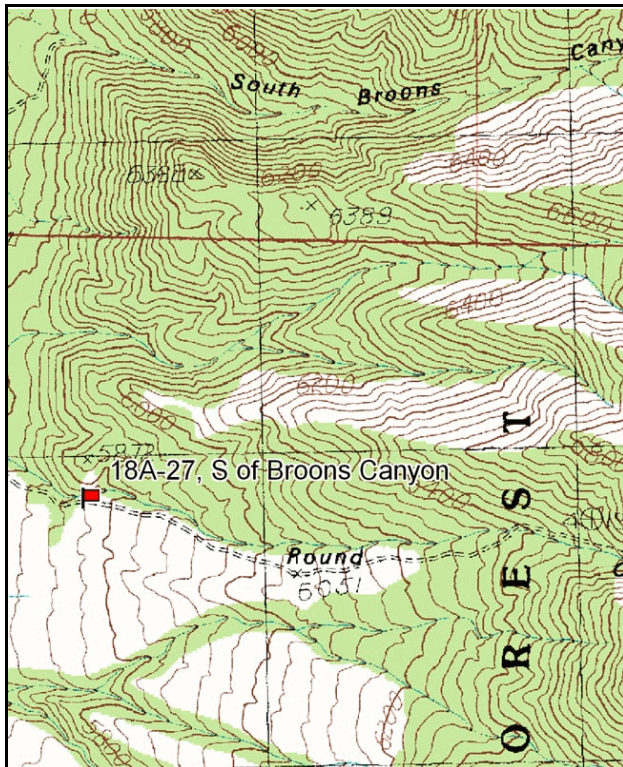
Vegetation type: Antelope bitterbrush.

Compass bearing: frequency baseline 178 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From I-80, proceed south on Skull Valley Road for 11 miles. Turn east of a dirt road (between mile posts 24 and 25) and continue along this road for 2.4 miles to Delle Ranch. From the creek crossing on the road at Delle Ranch, proceed north towards Broons Canyon for 0.20 miles to an intersection. Go east for 0.05 miles to another intersection. Turn left, and go north 0.65 miles to the location of Study #18A-23. Continue 0.6 miles to a fork, go right (east). Continue approximately 0.5 miles to the Forest Service boundary fence. From the fence, go 0.4 miles to a witness post on the right side of the road. From this short fencepost, walk 13 paces south to the 0-foot baseline stake.



Map Name: Salt Mountain

Diagrammatic Sketch

Township 3S, Range 7W, Section 5

GPS: NAD 83, UTM 12T 359357 E 4494036 N

DISCUSSION

South of Broons Canyon - Trend Study No. 18A-27

Study Information

This study lies just above the Forest Service exclosure located in Round Canyon. The range type is antelope bitterbrush (*Purshia tridentata*) with interspersed mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) [elevation: 5,800 feet (1,768 m), slope: 18%, aspect: west]. During the 1983 reading, deer pellet groups were abundant and there was moderate utilization of the key browse species. In 1997, deer pellet group quadrat frequency was moderately high at 27%. A pellet group transect read in 2002 estimated 56 deer days use/acre (139 ddu/ha), which increased to 79 deer days use/acre (195 ddu/ha) in 2007. Most of the deer pellet groups sampled in 2002 were from winter use, but about 5% were from spring use. Cattle also grazed the area and were observed at the time the study was established. Cattle use was considered light in 1997, but was not noted in 2002 or 2007.

Soil

The soil is classified within the Kapod series (USDA-NRCS 2007). These soils are derived from igneous alluvium and are gravelly to sandy in texture. Soil texture is a sand clay loam with a neutral reaction (pH 6.7). Large to medium sized rocks are common on the soil surface. The majority of the ground has been covered by vegetation and litter since the study was established. Approximately 5% of the ground is bare. The erosion condition class was stable in 2002 and 2007.

Browse

Since sampling began, this area has possessed an especially hardy and productive population of antelope bitterbrush. This ecotype exhibits a semi-erect growth form with some smaller shrubs growing under the canopies of the larger individuals. There appears to be some hybridization with Stansbury cliffrose (*Cowania mexicana* ssp. *stansburiana*). This population has excellent seed production. It could be a potentially important seed collection site where seeds usually mature in the last half of July, depending upon local weather. Density of this thick layering stand has been difficult to estimate. It was estimated at 680 plants/acre (1,680 plants/ha) in 1997, 1,580 plants/acre (3,904 plants/ha) in 2002, and 900 plants/acre (2,224 plants/ha) in 2007. Total canopy cover was 39% in 2002 and 32% in 2007. Bitterbrush provided 70% of the total browse cover in 2002 and 60% in 2007. The population has been largely mature for the duration of the study. In 1983, the majority of the plants showed moderate use, but use has fluctuated from moderate-heavy to light since. Vigor remains good and there are few decadent plants. Annual leader growth averaged 4.6 inches (11.6 cm) in 2002 and 2 inches (5.1 cm) in 2007.

Sagebrush is present in moderate numbers and is of secondary importance. It made up 26% of the total browse cover in 2002 and 36% in 2007. Sagebrush density was 1,700 plants/acre (4,200 plants/ha) in 1997, 2,220 plants/acre (5,486 plants/ha) in 2002, and 2,000 plants/acre (4,942 plants/ha) in 2007. In 1983, 55% of the population was young plants, but the age structure has shifted to a mostly mature population. Decadence has increased from 14% in 1997 and 2002 to 35% in 2007. Utilization has been mostly light, and vigor is good. In 2007, 29% of the sampled sagebrush were infested with insects.

Broom snakeweed (*Gutierrezia sarothrae*), Utah juniper (*Juniperus osteosperma*), and stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* spp. *viscidiflorus*) are also present in low densities. Point-centered quarter data estimated juniper density at 62 trees/acre (153 trees/ha) in 2002 and 2007. The trunk diameter of the plants increased from 4.3 inches (10.9 cm) in 2002 to 6.8 inches (17.3 cm) in 2007.

Herbaceous Understory

The herbaceous understory composition consisted of mostly cheatgrass (*Bromus tectorum*) intermixed with perennial grasses in 1997 and 2002. Cheatgrass cover was 11% in 1997, 25% in 2002, and 16% in 2007. The

quadrat frequency of cheatgrass has been 97%-100% since 1997. Bluebunch wheatgrass (*Agropyron spicatum*) and Sandberg bluegrass (*Poa secunda*) comprise the majority of the remaining grass cover.

Forbs increased from 10% of the herbaceous cover in 2002 to 55% in 2007. The site supports a diverse composition of forbs, but only a few species were sampled more than occasionally. However, a few good to moderately palatable species provide a small amount of forage. Some of these have shown evidence of utilization in the past. Most important are common stickseed (*Hackelia patens*), Indian paintbrush (*Castilleja linariaefolia*), gray lomatium (*Lomatium grayi*), arrowleaf balsamroot (*Balsamorhiza sagittata*), and redroot eriogonum (*Eriogonum racemosum*). Perennial forb cover was 6% in 1997, 3% in 2002, and 15% in 2007. Annual forb cover was 2% in 1997, less than 1% in 2002, and 12% in 2007.

1989 TREND ASSESSMENT

The trend for browse is slightly down. The density of bitterbrush decreased from 966 plants/acre (2,387 plants/ha) to 666 plants/acre (1,646 plants/ha). Decadence increased from 0% to 15%, while young recruitment decreased from 14% to 5%. Eighty-five percent of the plants showed moderate-heavy use, but vigor remained good. Sagebrush density also decreased, from 733 plants/acre (1,811 plants/ha) to 532 plants/acre (1,315 plants/ha). Decadence increased from 5% to 25%, and the percent of young plants in the population decreased from 55% to only 6%. Utilization of sagebrush was mostly light, with 38% of the plants displaying moderate use, and vigor was good. The trend for grass is stable. There were no significant changes in the nested frequencies of perennial grasses. The trend for forbs is up. The sum of nested frequency for perennial forbs increased by 54%. However, forbs were sampled infrequently.

browse - slightly down (-1) grass - stable (0) forb - up (+2)

1997 TREND ASSESSMENT

The trend for browse is up. The density of bitterbrush remained stable since 1989 at approximately 680 plants/acre (1,680 plants/ha), while the density of sagebrush increased from 532 plants/acre (1,315 plants/ha) to 1,700 plants/acre (4,201 plants/ha). However, a larger area was sampled in 1997 than in 1989. The percent decadence in both populations decreased. Recruitment for these two species was low, with young plants only comprising 8% of the sagebrush population and 3% of the bitterbrush population. Vigor was good, and use of both species was mostly light. The trend for grass is stable. There were no significant changes in the nested frequencies of the sampled grass species. Cheatgrass comprised 57% of the total grass cover and 40% of the total herbaceous cover. The trend for forbs is up. The sum of nested frequency for perennial forbs increased by almost 40%. Wild onion (*Allium* sp.) and stickseed increased significantly in nested frequency. The Desirable Components Index (DCI) was rated as fair-good due to good browse cover with low decadence, but a low percentage of young shrubs in the population. Annual grass cover was also high.

winter range condition (DCI) - fair-good (64) Mid-level potential scale
browse - up (+2) grass - stable (0) forb - up (+2)

2002 TREND ASSESSMENT

The trend for browse is up. The density of both bitterbrush and sagebrush increased, although the increase in bitterbrush is likely due to sampling error caused by the thickness of the stand and the difficulty discerning the layered individuals. Bitterbrush had a density of approximately 1,580 plants/acre (3,904 plants/ha), while sagebrush had a density of 2,220 plants/acre (5,486 plants/ha). The browse is mostly mature, with few young plants sampled. Only 9% of the bitterbrush and 14% of the sagebrush plants were classified as decadent, and vigor remained good. Utilization of bitterbrush increased to mostly moderate-heavy. The trend for grass is down. The total nested frequency for perennial grasses declined 73%. There was also a significant decline in the nested frequency of the primary perennial species, bluebunch wheatgrass and Sandberg bluegrass. Cheatgrass was abundant and remained stable in frequency. The percent cover for cheatgrass increased from 11% to 25%. Cheatgrass provided 94% of the total grass cover and 84% of the herbaceous cover in 2002. The

trend for forbs is down. Nested frequency for perennial forbs declined 62%, and the number of perennial species sampled decreased from 18 to 8. Forbs only accounted for 4% of the total vegetative cover. It is likely that the dense shrub cover is suppressing the understory. The DCI declined to a poor rating due to large decrease in perennial herbaceous cover, and an increase in cheatgrass cover.

winter range condition (DCI) - very poor (32) Mid-level potential scale

browse - up (+2)

grass - down (-2)

forb - down (-2)

2007 TREND ASSESSMENT

The trend for browse is slightly down. The density of bitterbrush decreased from 1,580 plants/acre (3,904 plants/ha) to 900 plants/acre (2,224 plants/ha), likely an artifact of the slightly inflated sampling in 2002. Population decadence remained stable at 9%, and plants displayed good vigor. Forty-seven percent of the plants sampled displayed moderate-heavy use. The density of sagebrush slightly decreased from 2,220 plants/acre (5,486 plants/ha) to 2,000 plants/acre (4,942 plants/ha), a 10% decrease. Sagebrush decadence increased from 14% to 35%, and the plants classified with poor vigor also increased from 5% to 12%. Utilization for this species was low. The trend for grass is up. The sum of nested frequency for perennial grasses increased more than two-fold. There were significant increases in the nested frequencies of two perennial grass species: Sandberg bluegrass and oniongrass (*Melica bulbosa*). Perennial species comprised 28% of the grass cover, which was an increase from 6% in 2002. The average cover of cheatgrass decreased from 25% to 16%, and this species composed only 33% of the herbaceous understory, as opposed to 84% in 2002. However, cheatgrass remained stable in nested frequency, and was sampled in 100% of the quadrats. The trend for forbs is up. The nested frequencies of eight forb species increased significantly since 2002. However, one of these species was bur buttercup (*Ranunculus testiculatus*), which is allelopathic and of little value (Buchanan et al. 1978), and another was storksbill (*Erodium cicutarium*), which can outcompete and prevent the establishment of native species (Kimball and Shiffman 2003). Forbs accounted for 33% of the total vegetative cover. The DCI increased to a poor-fair rating, due to improvements in the herbaceous understory.

winter range condition (DCI) - poor-fair (51) Mid-level potential scale

browse - slightly down (-1)

grass - up (+2)

forb - up (+2)

HERBACEOUS TRENDS --

Management unit 18A, Study no: 27

Type	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
G	Agropyron spicatum	_b 138	_b 109	_b 124	_a 45	_a 69	3.69	.96	3.38
G	Bromus tectorum (a)	-	-	_a 338	_a 339	_a 342	10.86	25.41	16.01
G	Melica bulbosa	-	-	_{ab} 20	_a 7	_b 20	.30	.36	.24
G	Poa fendleriana	-	_a 5	_a 4	_a 4	_a 1	.00	.15	.00
G	Poa secunda	_b 138	_b 159	_b 141	_a 21	_b 116	4.19	.22	2.57
Total for Annual Grasses		0	0	338	339	342	10.86	25.41	16.01
Total for Perennial Grasses		276	273	289	77	206	8.20	1.70	6.19
Total for Grasses		276	273	627	416	548	19.07	27.11	22.20
F	Agoseris glauca	-	_b 18	_a 3	-	_{ab} 9	.00	-	.51
F	Alyssum alyssoides (a)	-	-	_a 41	_a 26	_b 63	.16	.12	.46
F	Allium sp.	_a 3	_{ab} 24	_c 63	_{ab} 27	_{bc} 34	.53	.49	.16
F	Antennaria rosea	2	-	-	-	-	-	-	-
F	Astragalus sp.	_a 2	_b 17	_a 1	-	_a 4	.00	-	.06
F	Balsamorhiza sagittata	-	_a 1	_a 2	_a 1	_a -	.21	.03	.00
F	Castilleja linariaefolia	-	-	5	-	-	.01	-	-
F	Calochortus nuttallii	_a 3	_a 3	_a 5	-	_a 2	.02	-	.00
F	Chenopodium sp. (a)	-	-	4	-	-	.00	-	-
F	Cirsium neomexicanum	_a 6	_a 12	_a 5	-	_a 1	.20	-	.03
F	Comandra pallida	-	-	_a -	-	_a 5	.00	-	.03
F	Collinsia parviflora (a)	-	-	_a 31	_a 27	_b 62	.11	.13	1.34
F	Crepis intermedia	_a 5	_a 7	_a 4	_a 11	_a 11	.09	.15	.16
F	Descurainia sp. (a)	-	-	_a 3	-	_b 51	.00	-	.46
F	Draba sp. (a)	-	-	-	-	5	-	-	.01
F	Epilobium brachycarpum (a)	-	-	15	-	-	.06	-	-
F	Erodium cicutarium (a)	-	-	_b 32	_a 5	_c 85	.31	.03	.89
F	Eriogonum racemosum	-	_a 1	_a 2	-	_a 1	.03	-	.00
F	Galium boreale	-	_a 33	_a 17	-	_b 152	.37	-	8.05
F	Hackelia patens	_a 39	_a 28	_b 88	_a 40	_a 41	3.30	1.24	1.50
F	Holosteum umbellatum (a)	-	-	_b 99	_a 13	_c 266	.66	.05	7.50
F	Lactuca serriola	-	-	_a 11	-	_a 5	.06	-	.04
F	Lithospermum ruderales	_a 3	_a 2	_a 3	_a 2	_a 4	.56	.30	.53
F	Lomatium grayi	_a 17	_a 22	_a 19	_a 9	_b 66	.38	.10	3.26
F	Lygodesmia sp.	-	-	13	-	-	.06	-	-
F	Machaeranthera canescens	-	-	14	-	-	.04	-	-

T y p e	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
F	Microsteris gracilis (a)	-	-	_a 11	_a 3	_b 57	.18	.01	.38
F	Montia perfoliata (a)	-	-	-	-	36	-	-	.74
F	Phlox hoodii	-	-	-	-	2	-	-	.00
F	Phlox longifolia	_a 23	_a 56	_a 56	_a 31	_a 35	.25	.22	.26
F	Polygonum douglasii (a)	-	-	2	-	-	.00	-	-
F	Ranunculus testiculatus (a)	-	-	_a 5	_a 7	_b 48	.03	.01	.21
F	Sisymbrium altissimum (a)	-	-	-	_a 2	_a 6	-	.03	.03
F	Tragopogon dubius	_b 48	_a 4	_a 11	_a 3	-	.08	.03	-
F	Zigadenus paniculatus	-	4	-	-	-	-	-	-
Total for Annual Forbs		0	0	243	83	679	1.54	0.40	12.06
Total for Perennial Forbs		151	232	322	124	372	6.24	2.58	14.64
Total for Forbs		151	232	565	207	1051	7.79	2.99	26.71

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --

Management unit 18A, Study no: 27

T y p e	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	Artemisia tridentata vaseyana	50	54	59	13.35	12.59	11.84
B	Chrysothamnus nauseosus albicaulis	0	1	1	-	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	5	4	3	.06	.33	.00
B	Gutierrezia sarothrae	18	7	1	.70	.15	.38
B	Juniperus osteosperma	0	1	1	-	1.00	.76
B	Purshia tridentata	29	47	36	23.27	33.45	19.59
Total for Browse		102	114	101	37.38	47.53	32.58

CANOPY COVER, LINE INTERCEPT --

Management unit 18A, Study no: 27

Species	Percent Cover		
	'97	'02	'07
<i>Artemisia tridentata vaseyana</i>	-	15.14	16.66
<i>Chrysothamnus viscidiflorus viscidiflorus</i>	-	-	.03
<i>Gutierrezia sarothrae</i>	-	.33	-
<i>Juniperus osteosperma</i>	3.40	.23	1.78
<i>Purshia tridentata</i>	-	39.34	32.01

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 18A, Study no: 27

Species	Average leader growth (in)	
	'02	'07
<i>Artemisia tridentata vaseyana</i>	9.5	2.7
<i>Purshia tridentata</i>	11.6	2

POINT-QUARTER TREE DATA --

Management unit 18A, Study no: 27

Species	Trees per Acre		Average diameter (in)	
	'02	'07	'02	'07
<i>Juniperus osteosperma</i>	62	62	4.3	6.8

BASIC COVER --

Management unit 18A, Study no: 27

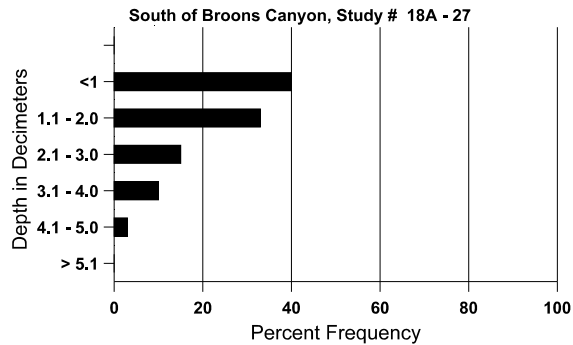
Cover Type	Average Cover %				
	'83	'89	'97	'02	'07
Vegetation	2.75	16.00	56.69	66.97	68.68
Rock	5.00	8.75	7.96	8.05	10.65
Pavement	.50	2.00	1.64	.60	1.18
Litter	84.25	65.50	62.09	49.21	35.11
Cryptogams	1.00	.75	1.17	1.01	1.39
Bare Ground	6.50	7.00	3.67	3.98	4.51

SOIL ANALYSIS DATA --

Herd Unit 18, Study no: 27, South of Broons Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	Sandy clay loam			%OM	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
12.1	68.0 (15.2)	6.7	50.0	27.4	22.6	3.6	16.8	275.2	.4

Stoniness Index



PELLET GROUP DATA --

Management unit 18A, Study no: 27

Type	Quadrat Frequency		
	'97	'02	'07
Rabbit	35	36	32
Elk	1	-	8
Deer	27	24	17
Cattle	1	-	-

Days use per acre (ha)	
'02	'07
-	-
-	-
56 (137)	79 (195)
-	-

BROWSE CHARACTERISTICS --

Management unit 18A, Study no: 27

		Age class distribution (plants per acre)					Utilization					
Y	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	91/113
Artemisia tridentata vaseyana												
83	733	-	400	300	33	-	36	5	5	-	5	30/40
89	532	-	33	366	133	-	38	6	25	-	0	21/24
97	1700	140	140	1320	240	80	18	0	14	2	5	27/37
02	2220	-	100	1820	300	80	12	0	14	5	5	29/38
07	2000	240	20	1280	700	140	7	0	35	12	12	34/49

		Age class distribution (plants per acre)					Utilization					
Y e a r	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus nauseosus albicaulis												
83	0	-	-	-	-	-	0	0	0	-	0	-/-
89	0	-	-	-	-	-	0	0	0	-	0	-/-
97	0	-	-	-	-	-	0	0	0	-	0	-/-
02	20	-	-	20	-	-	100	0	0	-	0	15/20
07	20	-	-	-	20	-	0	0	100	100	100	-/-
Chrysothamnus viscidiflorus viscidiflorus												
83	66	-	33	33	-	-	50	0	0	-	0	20/31
89	132	100	66	66	-	-	25	0	0	-	0	12/12
97	100	-	20	80	-	-	0	0	0	-	0	16/29
02	120	-	-	120	-	-	0	0	0	-	0	15/23
07	60	-	-	40	20	-	0	0	33	-	0	14/22
Gutierrezia sarothrae												
83	3200	133	1600	1600	-	-	0	0	0	-	0	13/14
89	1932	-	366	933	633	-	2	0	33	10	17	8/10
97	840	40	100	740	-	-	0	0	0	-	0	12/12
02	220	-	-	180	40	120	0	0	18	-	0	10/12
07	20	-	-	20	-	-	0	0	0	-	0	10/16
Juniperus osteosperma												
83	66	-	-	33	33	-	0	0	50	-	0	67/51
89	66	-	-	33	33	-	50	0	50	-	0	89/94
97	0	-	-	-	-	20	0	0	0	-	0	-/-
02	20	-	-	20	-	-	0	0	0	-	0	-/-
07	20	-	-	20	-	-	0	0	0	-	0	-/-
Purshia tridentata												
83	966	33	133	833	-	-	83	10	0	-	0	45/41
89	666	-	33	533	100	-	70	15	15	-	0	46/86
97	680	20	20	660	-	20	15	0	0	-	0	52/91
02	1580	-	20	1420	140	-	56	29	9	3	3	54/94
07	900	40	20	800	80	40	27	22	9	-	0	56/89